Namibia Wissenschaftliche Gesellschaft
Namibia Scientific Society

JOURNAL

Band / Volume 67 - 2020

Journal	67	Windhoek	2020	ISBN: 978-99945-76-71-5	ISSN: 1018-7677

Namibia Wissenschaftliche Gesellschaft – Namibia Scientific Society

JOURNAL

Band / Volume 67 - 2020

Journal 2020	Windhoek	ISBN: 978-99945-76-71-5	ISSN: 1018-7677

Author / Verfasser	Contents / Inhalt	Pages / Seiten
STRUCTURE OF THE SOCIETY		3
CHARLES HELM, PAUL KLENKE	*LETTER TO THE EDITOR:* TERRAHELION IN NAMIBIA	7-10
ANDRÉ DU PISANI	SEEING AND REMEMBERING: ROCK ART SITES AT THE FARM *KRUMNECK* IN THE KHOMAS REGION OF NAMIBIA	13-28
ANDRÉ DU PISANI	THE WAY WE WERE: ROCK ART IN THE KHOMAS REGION OF NAMIBIA	29-44
ALFRED SCHLEICHER	THE BUSHMANLAND TENT TORTOISE (NAMIBIA FORM), *PSAMMOBATES TENTORIUS VERROXII* – FIELD OBSERVATIONS, FREE-RANGE HUSBANDRY AND REPRODUCTION IN NAMIBIA	47-59
SIGRID SCHMIDT	HUNTER, GAME, AND LORDS OF ANIMALS IN SOUTHERN AFRICA	61-76
ULRICH THIEL	HERMANN NIEß – DIE KARRIERE EINES SÄCHSISCHEN BERGBEAMTEN VON DER KAISERZEIT BIS IN DIE NS-DIKTATUR	79-98
GUIDELINES FOR AUTHORS		101

Cover Photo / Umschlagfoto Adult Bushmanland Tent Tortoise in natural habitat by Alfred Schleicher

Publisher & Advertising
Verlag & Anzeigenredaktion
Namibia Scientific Society
Namibia Wissenschaftliche Gesellschaft
110 Robert Mugabe Ave., Windhoek
Postfach / P.O. Box 67, Windhoek / Namibia
Tel: 061-22 53 72, Fax: 061-22 68 46
E-mail: nwg@iway.na

Website www.namscience.com.na

Editing / Lektorat Alexander Brewis, Robert West
Layout Miriam Hutterer

Editorial Board
supported by
Dr Michael Backes
Prof. André du Pisani, Prof. Heather Throop,
Prof. Norbert Jürgens, Prof. Piet van Rooyen

Printing / Druck John Meinert Printing, P.O. Box 56
Windhoek / Namibia, Tel: 061-22 54 11

The Bushmanland Tent Tortoise (Namibia form), *Psammobates tentorius verroxii* – Field Observations, Free-range Husbandry and Reproduction in Namibia

Alfred Schleicher

Keywords: *Psammobates,* Field and Captive Observation, Husbandry, Behaviour, Captive Propagation

Introduction

Bushmanland Tent Tortoises *Psammobates tentorius verroxii* (Smith, 1839) have a relatively large distribution area, which extends from southern Namibia to South Africa (large parts of the Cape Province and Karoo). This species mainly lives in dry, sandy landscapes with quartz stones, sparse grass and small bushes (often three-thorn bushes) (Fig. 1). The biotopes in Namibia and South Africa are similar, but there are significant differences in the annual rainfall. The areas of extreme drought in the distribution area of *Psammobates t. verroxii* are more noticeable in Namibia than in South Africa. The populations from southern Namibia, especially, usually have to survive longer periods of drought with annual rainfall levels below

Fig. 1 Habitat of the Bushmanland Tent Tortoise in southern Namibia

100mm. That is why they have specially adapted during the past. These adaptations will be discussed in depth later in the text.

These tortoises are relatively small and reach an average shell length (stock dimension) of only approx. 100mm (males) to approx. 150mm (females). Females are larger and can weigh more than 500g.

The carapace shape of the back is usually only moderately curved and the shields generally have a more or less pronounced yellowish to orange star pattern, mostly on a dark brown background (Fig. 2). The carapace shape of the tortoises is also significantly less raised than in *P. t. tentorius* and *P. t. trimeni*. The plastron appears yellowish with only irregular dark stripe patterns. Young specimens usually show a clear dark coloured mask on the plastron (Fig. 3), which fades with increasing age; in addition, the marginal shields are clearly jagged. Depending on the area of distribution, rust-brown and sometimes orange-coloured individuals with only insignificant stripes or stars are also found (Fig. 4 and 5). The soft parts are yellowish to brownish. Head and neck area can also be reddish orange in some populations. This colouration is more common in South African popula-

Fig. 2 Beautifully coloured adult female

Fig. 3 Plastron of a juvenile specimen

Fig. 4 Adult female with brown-orange colouration morph

Fig. 5 Male specimen with a clear orange colour and only moderate streaking of the carapace

tions. Generally, the main phases of activity of this beautifully coloured tortoise are limited to the times of the year when rainfall is possible. Since many distribution areas are also winter rain areas, these tortoises do not really have a complete hiding period during the cold or cooler season. Little is still known about this species. This fact encouraged us to observe the Bushmanland Tent Tortoise all year round, both in the natural environment and in the outdoor enclosure in Namibia. Targeted experience was gained by doing that. For this purpose, five wild adult specimens were equipped with a tracker/transmitter system in the Tiras Mountains in southern Namibia (Fig. 6).

Fig. 6 Adult male with tracker at research location southern Namibia

These tortoises are checked at regular intervals between 3 and 6 weeks with a telemetry device. By doing that, their locations can be tracked. Measurements (weight, length) are done at longer intervals. In order to avoid stress, this has to be done with care. A horn-friendly adhesive (Technovit®-2-Bond) was used to attach the transmitter to the carapace. This has been proven to leave no damage to the shell and is primarily used for the claw treatment of cattle.

Behaviour in nature

Due to their distribution area, many individual populations live in areas where rain can only be expected during summer. Other populations far in the southwestern part of Namibia enjoy summer and winter rain. If I write “can” it is because rain falls relatively unreliably, especially in the south of Namibia – if at all. As in the past three years, it can happen that in some distribution areas no rainfall was recorded at all. In cases like that the tortoises are forced to survive long dry spells in caves, under rock formations or even under shrubs. The phenomenon of very long, dry seasons could also be worsened by climate change. However, the low annual rainfall is normal in southern Namibia. According to measurements, the annual average amount of precipitation per year in good rainy years is around 130mm, sometimes well above 170mm. However, this is an absolute exception (see Fig. 7 and 8). Fortunately, the Namibia form of the Bushmanland Tent Tortoise does not get too much rain or water in any form. It seems that long spells of a higher amount of rain can be extremely threatening for the tortoises (as with succulents such as Lithops). More than 20 years ago the Ministry of Environment and Tourism (MET) in Namibia handed over two adult specimens of *P.t. verroxii* for further captive care. After appropriate preparation, we were able to transfer the tortoises to a designated outdoor enclosure. Keeping went well for

Fig. 7 Remaining vegetation after long period of drought – Tiras mountains

Fig. 8 Same location after rare heavy rains

a few months until heavy thunderstorm activities started in Windhoek, lasting several days, with corresponding good rainfall figures. One of the tortoises showed marked skin edema (after three days fluid retention in the tissue) and, like the second tortoise, died after three days. Since I couldn't make sense of the sudden death of the tortoises, I called Dr Felix Mettler and asked him for help. At that time, he was employed as an animal pathologist in the Central Veterinary Laboratory Windhoek. A pathological examination of the tortoises showed a devastating result. The intestinal tract of the tortoises showed ulcer-necrotic narrowing and signs of perforation in the free abdomen in some places (Fig. 9). In addition, the examination of the bladder of one of the specimens showed that the inner surface was filled with very small bladder stones (semolina) like concrete and was therefore able to absorb or excrete urine only with great difficulty. This could have been caused by sedimentary deposition of calcium oxalate or uric acid. In humans, these deposits cause mainly kidney stones. During the dry months, the tortoises are observed to feed on shoots of different euphorbia plants growing on the ground. This dietary behaviour combined with only moderate water absorption could lead to corresponding deposits in the bladder.

This leads to the next question: "Where do the tortoises get their vital water and moisture from?" In years with normal rainfall, the relatively sparse rain and the availability of fresh green plants, grass or various succulents, *Aizoaceae ssp.* and *Cotyledon orbiculata* plants found in the habitat are certainly enough. Otherwise, these tortoises are absolute specialists. Like other forms of the genus *Psammobates*, Bushmanland Tent Tortoises for example, are able to have the mist condense on their shell (similar to the tapping-beetles/tok-tokkies in the Namib desert). The tortoises let the condensate (or raindrops in rare rain showers) drip over their front legs. (see Fig. 10). They then skillfully guide the water into the mouth in order to drink (Schleicher, 2015). With the help of the southwest winds, the fog from the Atlantic Ocean can move up to 70 kilometres (or even more) inland and thus reach the tortoise habitats. What was previously unknown is the fact that the tortoises can also absorb this moisture from the air through opening and closing of their mouths.

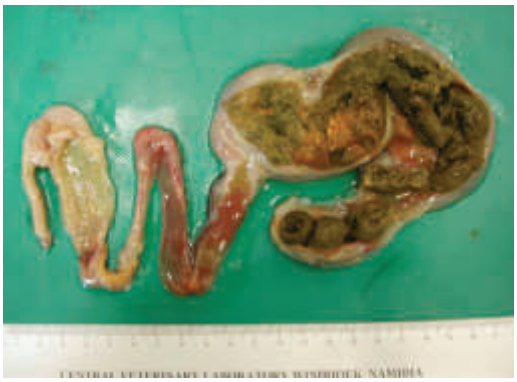

Fig. 9 Prepared and examined intestinal tract

Fig. 10 Bushmanland Tent Tortoise drinking

The moisture is most possibly absorbed by the mucous membranes. This behaviour observed by us (both in nature and in the outdoor enclosure) is very special and requires further clarification.

Bushmanland Tent Tortoises avoid digging themselves into the ground. They rather seek shelter under shrubs or next to stones or rocks, which are warmed up by the sun. The tortoises make a hollow with their front legs and cover their carapace with sand (see Fig. 11).

Fig. 11 Healthy specimens like to rest next to stones and throw sand at the carapace

Outdoor enclosure

We have been caring for two pairs of these tortoises in two separate outdoor enclosures for many years. Three of the tortoises were brought to us by the public and one of the males is a legal wild caught specimen captured from the distribution area in southern Namibia. Both outdoor enclosures are adapted to their natural conditions. The enclosures are positioned in such a way that the largest possible amount of sunshine can be collected throughout the day. The morning sun is particularly valuable for keeping the tortoises in good condition. The cold-blooded tortoises need the warming morning sun to obtain enough energy for the day. Even in nature, the tortoises sunbathe immediately after sunrise in order to be able to absorb as much of the warming solar radiation as possible (especially during the times of sometimes extremely cold winter mornings). The enclosures are planted with bushes and shrubs (mostly from the natural biotope) and many rock formations provide shelter. The rocks naturally store heat in winter and provide shade during the hot summer days. In addi-

Fig. 12 The outdoor enclosures were roofed to avoid problems caused by heavy rains in Windhoek

Fig. 13 Controlled irrigation of the enclosure is essential

tion, moisture-sensitive plants such as Hoodia *(Hoodia gordonii)* and so-called dog poison plants (*Larryleachia marlothii,* formerly known as *Trichocaulon marlothii*) were planted in the enclosures. These plants also serve as indicators of too much moisture or drought.

The experience of the first few years in keeping the Bushmanland Tent Tortoises in captivity led us to roof the outside enclosures with a transparent corrugated PVC to avoid problems in the event of heavy and persistent precipitation here in Windhoek (see Fig. 12). The roof is placed high enough to ensure that it blocks the unfiltered sunlight only when the sun is at its zenith. The cover also helps with the possibility of controlled water supply, in line with the measured precipitation of their natural habitat (Fig. 13). This type of arrangement provided very good results.

Moist, or even shady, wet spots (so-called damp chambers) under leaves, shrubs or wood can be dangerous for the tortoises and will quickly lead to symptoms of illness or even the death of the tortoises. It is therefore more than essential to cut bushes or shrubs regularly that grow in the enclosures.

The research of the past 25 years has shown us that *P. t. verroxii* is very specifically adapted to its climatically extreme habitat. In conclusion, if the keeping of the tortoises here in Namibia is so challenging, their keeping in Europe should not be considered unless considerable effort is made to replicate their natural habitat.

Diet

In nature, the tortoises' food consists primarily of different forms of short grasses such as *Stipagrostis obtusa* (Small bushman grass), which grow especially in the red sand biotope. In addition, different flowers, succulents, members of the *Aizoaceae* family (formerly *Mesembryanthemum* ssp., Fig. 14), Euphorbia (*Euphorbia inaequilatera,*

Fig. 14 Mesembryanthemum crystallinum (Aizoaceae) blooming

Fig. 15 Dwarf grass (Oropetium capense) growing after some rain

Euphorbia hirta), meadow thistles, and a wide variety of leaves and seeds form part of the tortoises' diet. What is noticeable is that the tortoises do have a preference for blue or violet flowers.

So far, we have also been able to observe the tortoises consuming *Ruschia spinosa, Oxalis ausensis* (yellow form) and *Oxalis obtusa* (Namib desert clover), *Hereroa puttkameriana*, *Limeum argute-carinatum*, *Indigastrum (Indigofera) argyraeum*, *Aizoon sarmentosum, Aptosimum vinescensee, Oropetium capense* (three-day or dwarf grass) (see Fig. 15) and *Avonia papyracea* ssp. *namibiensis* (pigeon foot).

Interestingly, it was observed that plants from the *Crassulaceae* family, such as *Cotyledon spp.* are also eaten in captivity.

Green plants (or parts thereof) and flowers are usually on the menu only after very sparse rain (like *Gazania jurineifolia ssp. scabra*). These common rain plants are *Talinum sp., Portulaca oleracea* and *Tribulus zeyheri* (morning star). Both the fresh green leaves and the yellow flowers of these plants are eaten with great relish. However, the specially adapted organism of the Namibia form of *P.t. verroxii* does not tolerate fresh, moist food in the long-term application without getting ill or showing serious health problems (e.g. metabolic disorders).

For very long periods of the year, the Bushmanland Tent Tortoises eat almost exclusively dry or dust-dry food with high content of raw fibres. The food consumed in this way usually remains in the intestine for quite some time and is thus available for digestion over a long period of time. The tortoises are furthermore able to reduce their metabolism drastically. This special adaptation enables them to survive in the dry habitats of southern Africa. TThe observations already undertaken, as well as those still in progress, of the specie in nature in the south of Namibia have helped us to optimize the care them in a 'close to nature' open-air enclosure in an adequate way.

Based on the knowledge we have acquired, we only occasionally offer offer the tortoises fresh food such as fresh flowers, dandelions, euphorbia or fresh grass. We rather

dry a wide variety of leaves and wild flowers and herbs and store the mixtures in linen bags. Of course, specimens long kept in captivity become tame and would also consume salad, vegetables and other common tortoise feed. Previously we used to offer the tortoises boiled beans mixed with moistened rabbit pellets. Nowadays, we are refraining from these "gifts", because after a while this will usually lead to the sudden death of the tortoises, probably caused by unnecessary intestinal parasites. The popular idea that animals will not consume food that is harmful for them, is definitely untrue in the case of the tortoises.

Reproduction

The mating behaviour of these tortoises is initiated primarily by the presence of moisture. Even an increase in the average relative humidity to values of 20% and more (for example due to foggy, humid air from the sea) initiates this behaviour. It does not have to rain first. The males are then constantly looking for a partner. It is not easy to find what you are looking for as the population density is only about 3-5 specimens per hectare (calculated average in areas suitable for tortoises). Often you can see several males trying to find favour with the female. The oviposition of the 1-2 eggs (Cunningham et al., 2004) then takes place depending on the possible rainfall. Preferred oviposition sites are under three-thorn bushes *(Rhigozum trichotomum*). This was also described by Cunningham & Simang (2008) and thus coincides with our observations. Before the rains set in, gravid females who want to lay eggs often migrate to the bushes in advance to lay their hard-shelled eggs. Eggs laid in the enclosure had a size of L x W 40.5 x 25.5mm with a mass of 16g. Another clutch showed the egg size of 38.0 x 24.0mm with a mass of 13g.

Here in Windhoek in most of the observed cases the weather conditions were cloudy or just before substantial thundershowers with a measured relative humidity of 70-80%. After a long incubation period of well over 300 days (sometimes up to 14 months), the hatchlings also hatched only after rain with more than 18mm of precipitation, and within

Fig. 16 Psammobates tentorius verroxii hatchling

Fig. 17 Plastron of hatchling

24 hours. The babies showed an average size of L x W = 30/33 x 30/34mm and a mass of 10g (Fig. 16 and 17). The hatchlings are kept outdoors in a plastic tub with a wood-framed gauze lid (Fig. 18). In order to prevent infestation of soft ticks, we do not use a substrate, but only newspaper and a decoration made of stones, root pieces and cut grass (which dries very quickly in Namibia) as hiding places. Every 2-3 weeks, the small tortoises are placed in a water bath for less than 5 minutes (Fig. 19). This is however only done during the very dry or hot season to prevent the tortoise babies from drying out. The hatchlings only get additional water or moisture by introducing fresh, damp grass (which is also eaten) when cleaning the container approximately once a week or, if necessary, even more often. The hatchlings are offered the same food as supplied to the adults. Occasionally a small piece of cucumber is offered to provide the babies and adults with enough moisture during the dry season. So far, this kind of husbandry has proven to be quite effective and the hatchlings have developed very well (Fig. 20).

Over time, both males have increasingly lost interest in the females. Interestingly, if a second male is introduced into the enclosure, the long-serving male then starts immediately with the typical mating behaviour. In order to counteract the reluctance to mate, we have decided to bring in an additional male for each outdoor enclosure in the near future.

Another problem arose when trying to socialize larger juvenile offspring with the adult specimen of the other group. It suffered so much from stress that it stopped eating and started hiding deep under a tuft of grass. Unfortunately, we noticed this too late and the specimen was found dead.

Fig. 18 Plastic tub with a wooden-framed lid as a protection against soft ticks

Fig. 19 The juvenile tortoises are placed in a water bath every 2-3 weeks (during dry season only)

Fig. 20 Juvenile 2-year-old specimen

As a precaution to prevent unnecessary spreading of parasites, the tortoises were carefully examined and treated in advance, before they were relocated to the outside enclosures of the adults. The medication usually used for other species of tortoises proved to be not well tolerated. We have had very bad experiences with Panacur® (active ingredient: Fenbendazole) in the past. The preparation (doses) that can otherwise be used for deworming tortoises showed some lethal consequences not only for the parasites, but especially for Tent tortoises!

In contrast, the oral administration via a stomach tube (suspension) of Welpan® (active ingredient: Febantel and Pyrantel embonate) was very well tolerated by all animals. The treatment (2ml per kg body weight) must be repeated after 14 days.

Parasites

While we found almost no ticks on wild tortoises from the south of Namibia, things look very different here in Windhoek in the outdoor enclosure. Especially at the beginning of the local (possible) rainy season from December to April (occasionally rain can also fall in October), the tortoises are attacked by different kinds of ticks *(Amblyomma marmoreum, Hyalomma spp., Ornithodorus spp.)*. This causes enormous problems for the tortoises and therefore for the keeper as well. It seems that the tortoises are much more sensitive to tick forms that do not necessarily occur in the distribution area than, for example, to tick species that are already known in the natural distribution area of the tortoises. Young tortoises or hatchlings in particular can die overnight if infected. Failures were also reported for other types of tortoises. The ticks partially paralyzed the tortoise and the immobile specimen then died quickly in strong sunlight. Around the bite location (mainly soft, fleshy parts of the body), necrosis formation was observed with corresponding pronounced tissue destruction.

Threat

The natural enemies of the tortoises are various types of birds, mongoose, jackals, ostriches (babies), monitor lizards and also humans. Some tortoises are poached for the saucepan or for the pet market. Land use and its aftermath is also fatal to some populations and is an important aspect. The consequences of climate change on these tortoises remain to be seen.

Summary

The Bushmanland Tent Tortoise is one of the most beautiful tortoises. It consistently inhabits dry to very dry habitats (especially in Namibia) due to its special way of life. As these tortoises are highly adapted to their native habitat conditions, it is difficult for the tortoises to adapt to environments outside of their natural bioclimatic range, or even to survive in a terrarium (indoors) for a longer period of time. Even, wild caught or offered specimen kept in the roofed open-air enclosure have shown many problems at the beginning and often only started to feed after a period of more than 6-10 weeks. Specimens from Namibia (Namibia form of *P.t. verroxii*) are extremely adapted to the dry, almost desert-like landscapes and also show highly specialized strategies to survive long spells of drought. The climatic conditions together with the extreme light and sunlight as well as the normal very low relative humidity (often just 10% or less) is difficult to maintain successfully in captivity. To achieve conditions like that in Europe is extremely challenging and takes a lot of effort. If an experienced keeper of tortoises nevertheless decides to keep these tortoises, knowledge of the origin of the tortoises is of utter importance in order to satisfy even the basic needs of the tortoises, and their basic needs. In addition, a lot of tortoises are handled as smuggled goods and sold as pets. This results very often in the certain death of the tortoises. In conclusion, the inexperienced but responsible tortoise friend and keeper should rather keep their hands off these tortoises.

Acknowledgment

The author wishes to thank the Namibia Scientific Society for the friendly review of the manuscript.

The author would also like to thank the following persons and organisations:

Dr Ronald Schmäschke, – University of Leipzig (Parasitology) for examining the ticks.

I would like to thank the Kupferschmid family (Germany) for the active help in the research project in the south of Namibia and for the friendly transfer of experience in connection with the treatment / prophylaxis of parasites.

Mr Christian Swartbooi (Namibia) for his motivated collecting of data on site.

The Ministry of Environment and Tourism (MET) and the National Commission on Research, Science and Technology (NCRST) in Namibia for providing the necessary conservation and issuing necessary research and keeping permits (e.g. AN20171002).

Literature

BURKE A. 2003: *Plant guide for the southern Namib.* Namibia Scientific Society, Windhoek: 88 p.

CUNNINGHAM P.L., A. SIMANG & A. SCHLEICHER. 2004: *Testudinidae: Psammobates tentorius verroxii (Bushmanland tent tortoise)*. Clutch size. African Herp News 37: 19-20.

CUNNINGHAM P.L. & A. SIMANG 2008: *Ecology of the Bushmanland Tent Tortoise (Psammobates tentorius verroxii) of Southern Namibia.* Chelonian Conservation and Biology 7 (1), 119-124.

KLAASSEN E. S. & CRAVEN P. 2003: *Checklist of grasses in Namibia.* Capture Press, Pretoria, Second Edition: 139 p.

SCHLEICHER A. 2015: *Reptilien Namibias.* Namibia Scientific Society, Windhoek: 365 p.

WILLIAMSON G. 2010: *Richtersveld – The Enchanted Wilderness.* Umdaus Press, Hatfield, Second Edition: 260 p.

JOURNAL 67
Namibia Scientific Society / Namibia Wissenschaftliche Gesellschaft
Windhoek, Namibia 2020
ISSN: 1018-7677 ISBN: 978-99945-76-71-5

About the Author

Alfred Schleicher emigrated to Namibia from Germany in 1994. His passion for reptiles (mainly tortoises), started in his early years of childhood. Visits to Africa over an extensive period, research on African tortoise species (and other reptiles) offered him the opportunity to publish scientific and popular herpetological publications. Furthermore, he is the author of the book 'Reptiles of Namibia' and is head of the herpetological department of the Namibia Scientific Society in Windhoek.

Author's address

Alfred Schleicher, P.O. Box 30566, Windhoek, Namibia, E-mail: kidogo@iway.na.

CHR Water Consultants

Contact details: Greg Christelis Tel: +264-81 250 8302
+264-61-226 956
Email: gregchristelis@gmail.com

Offers Professional Consulting Services for

- Groundwater development;
- Aquifer assessments;
- Project management - includes drilling tenders, procurement, and project planning;
- Cross-cutting matters such as input to EIAs for various commodities, Cooperation with UNESCO, SADC and GEF on transboundary and international groundwater matters.